JC17 Rec'd PCT/PTO 16 MAY 2001

SUBSTITUTE FORM PTO-1390 U.S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER
12758-033001

U.S. APPLICATION NO. (If Known, see 37 CFR 1.5) 09/856028

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE99/03513	3 November 1999	26 November 1998

TITLE OF INVENTION
METHOD FOR RAMPING UP AN INTERFACE, E.G., A V5.2 INTERFACE

APPLICANT(S) FOR DO/EO/US
Max Kössldorfer

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ An English language translation of amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern other documents or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☒ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ Other items or information:
    ☐ English translation of International Search Report
    ☐
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May 16, 2001 Samantha Bell Samantha Bell

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JC18 Rec'd PCT/PTO 16 MAY 2001

U.S. APPLICATION NO. (IF KNOWN)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/856028	PCT/DE99/03513	12758-033001

17. ☒ The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)- (5)):

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710**

International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690**

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100**

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Claims	Number Filed	Number Extra	Rate		
Total Claims	4 - 20 =	0	x **$18**	$0.00	
Independent Claims	1 - 3 =	0	x **$80**	$0.00	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ **$270**	$0.00	
			TOTAL OF ABOVE CALCULATIONS =	$860.00	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$860.00	
			SUBTOTAL =	$0.00	
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Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$40.00	
			TOTAL FEES ENCLOSED =	$900.00	
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a. ☒ A check in the amount of $900.00 to cover the above fees is enclosed.
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NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.

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Description

Method for bringing up an intermediate interface, e.g. a V5.2 interface

The invention relates to a method for bringing up an intermediate interface (VIF) of a telecommunication network (TKN) to its operational readiness, via which two network elements (AN, LE) such as, e.g. a local exchange and an access network, for establishing and maintaining subscriber connections of the network (TKN) are connected and in which

- one or more links (LNK) are provided, the or each link (LNK) exhibiting a number of transmission channels (TSL) for exchanging user information of the subscriber connections and for exchanging communication information for controlling the subscriber connections and managing the intermediate interface (VIF) and
- due to a preestablished configuration of the intermediate interface (VIF), a number of transmission channels is provided as communication channels (TP1, TP2, TPS) for exchanging communication information and at least one (TP1, TP2) of the communication channels belongs to a first protection group,

wherein, in the operational state of the intermediate interface (VIF), the communication information is exchanged via communication paths (CPI, CPII) which are combined in groups (LC1, LCA, LCB) of in each case one or more communication paths and each communication path group is allocated at least temporarily to a communication channel, a number of predetermined communication paths (CPI) being combined in a separate communication path group (LC1) to which the first protection group (PGI) is allocated.

In telecommunication networks, network elements are provided as nodes for telecommunication connections. A

network element can be set up as access network for connecting subscriber terminal connections into the network and/or as a local exchange for linking subscriber connections to one another or to other network nodes or telecommunication networks. For this purpose, the network elements are networked together via links which have the transmission capacities necessary for establishing and maintaining telecommunication connections. The links connecting in each case two network elements are combined to form an intermediate interface for the tasks of controlling and managing the links, where an intermediate interface can comprise one to a number of links depending on the organizational structure. If necessary, e.g. with link capacity of appropriate size or in the case of special network architectures, two network elements can also be networked together by two or more intermediate interfaces.

During operation, the intermediate interfaces are largely managed in the network elements themselves. The structures recommended for the architecture, control and management of intermediate interfaces are defined in the standards of the European Telecommunication Standards Institute (ETSI) for the so-called V interfaces and especially the V5.2 interface. The design of the V5.2 interface is described in the standards ETS 300 324-1, 'Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE), V5.1 interface for the support of Access Network (AN)' and 'Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE), V5.2 interface for the support of Access Network (AN)', 2nd edition. In as much as it is required for understanding the invention, the essential features of an intermediate interface are briefly shown in the text which follows on the example of a V5.2 interface with the assistance of Figures 1 and 2; further information can be found in said standards.

Figure 1 shows an exemplary arrangement of network elements of a telecommunication network TKN which are connected by a V5.2 interface VIF. The first network element, shown on the left-hand side in Figure 1, is an access network (AN) which is used as concentrator for subscriber terminal connections TEA. The second network element on the right in Figure 1 is a local exchange (LE) and connected via internal interfaces of the network to other network nodes of the telecommunication network TKN such as, e.g. other local exchanges (LE') or a service control point (SCP) or to another telecommunication network TKN' via a so-called gateway GTW. Naturally, Figure 1 shows merely a simple example which shows only the features necessary for understanding the invention. A network element such as, for example, an access network or an exchange can be interconnected to other network elements via a number of intermediate interfaces and especially also to one or more network elements via in each case more than one intermediate interface, and not all intermediate interfaces need to be constructed as V5.2 interfaces.

The network elements AN, LE and their associated intermediate interfaces are configured and managed, for example, from terminals QTL constructed as so-called "workstation computers". The terminals QTL are connected to the network elements AN, LE via interfaces QIF which are especially provided for this purpose and which are called Q interfaces.

As indicated in Figure 1, the V5.2 interface VIF is implemented by using a number of links in the form of so-called V5 links LNK which must be regarded as a junction line designed for 2 Mbit/s. The abovementioned ETSI standards restrict the number of links in each case combined to form one V5.2 interface VIF to a maximum of 16. According to the ETSI standards, each link LNK exhibits 32 time

slots of 64 kbit/s each which are numbered through from 0 to 31. Time slot 0 of each link is used for the synchronization. The other time slots are used for exchanging information. Naturally, this includes the bearer traffic, i.e. the exchange of the user information of the subscriber connections; however, some time slots are used for exchanging so-called communication information. The communication information is exchanged between the two network elements AN, LE for purposes of control and management of the intermediate interface VIF and the bearer traffic passing over it. A time slot which is used for exchanging information of bearer traffic or communication information is identified by a transmission channel or, for short, channel; since the differentiation between the terms of time slot and its associated channel is of secondary significance in understanding the invention, the two terms are used without distinction in the text which follows.

The communication information transmitted via an intermediate interface VIF is divided into so-called protection groups. To each intermediate interface, one protection group of type 1 and of type 2 is in each case allocated. The type-1 protection group PGI comprises the communication protocols for controlling the operational state of the connections and the links and for controlling the distribution of the user channels (so-called control protocol, link control protocol, BCC protocol); these protocols are also called "vital" protocols. For the type-1 protection group, two time slots are reserved which belong to different links for reasons of safety. In these two links LN1, LN2, time slot 16 is in each case used for the type-1 protection group. The two links used for the type-1 protection group are in each case called primary link LN1 and secondary link LN2. The transmission of the PSTN protocol for the signals of the PSTN network and of the ISDN protocols of the ISDN service channels

(D channels) and ISDN packet data channels (p channels) are allocated to the type-1 and/or type-2 protection group. (The ISDN channels correspond to transmission paths and must not be mistaken for the transmission channels, especially the C channels explained below.) Time slots 15 and 31 of the primary link LN1 and of the secondary link LN2 and time slots 16, 15 and 31 of the other links of the intermediate interface VIF, that is to say up to 46 time slots, can be reserved for the type-2 protection group PGS depending on current demand, and the common use of a time slot for transmitting the type-1 protection group and the type-2 protection group is not being allowed, any more than is the common use of time slots for bearer traffic and the transmission of a protection group.

Each channel can take up the transmission of a number of transmission paths. A channel which is intended for transmitting communication information is called communication channel or C channel; such a C channel is also called physical C channel due to its fixed allocation to a (physical) time slot. A transmission path of a C channel which is thus used for exchanging communication information is called communication path or C path. On a C path, a communication protocol is in each case transmitted such as, e.g., the protocol of an ISDN service channel, and a C path is permanently allocated to the relevant communication protocol. In contrast, the allocation of the C paths to the C channels can be variable, e.g. in the case of a time slot being disturbed, the transmission of the C paths allocated to the disturbed time slot or C channel is diverted into another time slot (or more under certain circumstances).

For the purpose of managing the allocation to time slots, the C paths are combined in groups and one such

group can comprise one or more C paths. These groups of C paths are used as the unit which is allocated to the physical C channels and are correspondingly called "logical C channels" in said ETSI standards; in the text which follows, the designation communication or C path group or, for short, path group is used instead, also for reasons of clearer distinction. Thus, C paths are always allocated indirectly to time slots, namely by allocating in each case one C path group to one C channel, i.e. in other words, allocating a logical C channel to a physical one. A C channel which is allocated a C path group - the C channel "carries" the C path group - is called active. The other C channels called standby C channels are not used for exchanging information, at least temporarily. The allocation of the C path groups to C channels can change during the operation of the interface, for example due to a disturbance or following an instruction of the operator personnel. A standby C channel which is allocated a C path group then becomes an active C channel and, conversely, an active C channel becomes a standby C channel as soon as it no longer carries a C path group.

Figure 2 symbolically shows the internal structure of the primary and secondary links LN1, LN2 and of a further link LN3 of the intermediate interface VIF. It is ruled for the C paths of the type-1 protection group that they are always combined to form a C path group. The C paths CPI of the type-1 protection group PGI are thus always transmitted jointly, that is to say in the same channel TP1. According to what has been said above, this channel TP1 is time slot 16 of the primary link LN1 whilst time slot 16 of the secondary link is used as standby C channel TP2 of the type-1 protection group PGI. The remaining time slots provided as C channels are allocated to the type-2 protection group. Should there be a disturbance of the primary link LN1, the type-1 C paths CPI are switched to time slot TP2, which has been

kept available up to now, of the

secondary link LN2 as a result of which the secondary link becomes the primary one. It should be pointed out at this point that the numbers 1 and 2 in the reference symbols do not relate to the type of a protection group but in each group point to the primary link LN1 and secondary link LN2, respectively.

Figure 2 shows in an exemplary allocation some of the C channels TSA, TSC, TSD allocated to the type-2 protection group PGS, such as, in this case, time slot 15 of the secondary link LN2 and time slots 15 and 16 of the third link LN3 which in each case carry one C path group LCA, LCB, LCC with in each case one set of C paths CPII. Other C channels TSB, TSE of the type-2 protection group PGS are in standby. The allocation of the C path groups LCA, LCB, LCC to the C channels TSA, ..., TSE is optional, in principle, and can change during the interface operation due to protection switching operation in which a C path group is allocated to a C channel which was previously in standby.

To coordinate the allocation of the C path groups and of the protection switching operation, an additional protocol, the protection protocol, is simultaneously exchanged on both time slots TP1, TP2, allocated to the type-1 protection group, via separate transmission paths PP1, PP2 which will be called protection paths in the text which follows. As is illustrated on the example of the standby protection path PP2 on the secondary link LN2, the protection paths generally do not belong to a C path group but are allocated directly to the time slots TP1, TP2 reserved for the type-1 protection group PGI according to the protection architecture of the V5.2 interface. More detailed information relating to the protection protocol and the allocation of C paths to C path groups and of the latter to C channels can be obtained from ETSI standard ETS 300 347-1 and there, in particular, in chapter 18.

The relationships described apply to the intermediate interface in its operational state. For bringing up

the intermediate interface, a sequence of steps is defined in Annex C of ETSI standard ETS 300 347-1, especially at item 13 (briefly called "ETSI Annex C" in the text which follows), in which first the data link layer (layer 2 according to the OSI reference model, compare specification X.200 of the International Telecommunication Union (ITU) of the so-called LAPV5 (Link Access Protocol for V5) according to ETSI standards ETS 300 347-1, chapter 8, and ETS 300 125, is activated for the C paths to be taken into operation, and then are started due to the LAPV5, which is ready for operation, and the communication protocols, usually beginning with the protection protocol. During the start-up of the LAPV5 data link layer, a default profile established in advance, which defines an initial allocation of the C path groups to the C channels, is used in addition to a predetermined grouping of the C paths to form the C path groups and establishing the time slots provided as C channels. The default profile is only significant at the time of start-up because, of course, the allocation of the C path groups can be changed during operation. Naturally, both the local exchange and the access network must have identical copies of the default profile.

Using a default profile for establishing the initial allocation of the C path groups, however, entails the risk that the allocation is not compatible with that of the other network node, e.g. in the case of a unilateral interruption of operation and restart of the intermediate interface by one of the two network nodes. For this reason, additional timing elements are provided in ETSI Annex C, namely the so-called TC8 and TC9 timing elements which, in the case of a restart of a network node, are intended to ensure that the other network node, too, falls back to the default profile, by interrupting the exchange of information via the intermediate interface until the other network node aborts the attempts to establish communication and also initiates

a restart for the intermediate interface. For example, the TC9 timing element defines a dead time of 95 s which must elapse before the interface is brought up again by a network node as demanded by the operating personnel. This known solution is complicated and expensive not only because it uses a default profile, which is only needed for a short time, and additional timing elements but needs much time during a restart of the intermediate interface due to the dead times provided. Since, in addition, the correctness of the allocation is not checked during the start-up, there is a residual risk that, when the intermediate interface is brought up, a stable operating state is not achieved. In addition, it is assumed during the start-up of the interface that the initial allocations of the two network elements agree but this is not checked.

It is, therefore, the object of the invention to bring up an intermediate interface, especially a V5.2 interface according to the abovementioned ETSI standards, in such a manner that a stable operating state is reliably achieved and said error sources are eliminated and, in particular, no default profile is needed.

This object is achieved by a method for bringing up an intermediate interface (VIF) of the type initially mentioned, in which, according to the invention,

a) a primary communication path (PP1) is set up in the communication channel (TP1) of the first protection group or one of the communication channels of the first protection group, then

b) the communication path group (LC1) of the first protection group is allocated to the communication channel (TP1) containing the primary communication path on the basis of protection switching operation messages which are exchanged via the primary communication path (PP1) and relate to the allocation of the communication path groups to communication channels

and, if this has been done successfully,

c) the communication paths of the first protection group (PGI) are released for interchanging communication information.

This solution provides for a coordinated start-up of the traffic of the communication information by using protection switching operation messages. Analogously to the safety switching operation during the operation of the intermediate interface, the time slot in which the vital protocols are to be taken into operation is also synchronized between the network elements via the protection protocol or another primary communication protocol when the interface is brought up. Before taking a communication path group into operation, the time slot or communication channel to be used is always determined via the primary protocol. This does not require a default profile; the only thing needed is the information relating to the identification of the communication channels of the first protection group which is determined from another source, in any case. Other advantages are mentioned by reference to the exemplary embodiment.

In a preferred embodiment of the invention, if a number of communication channels (TP1, TP2) are allocated to the first protection group (PGI), the primary protection path (PP1) is set up in the communication channel which is the first one among said communication channels to provide an operational protocol for the primary communication path between the two network elements (AN, LE). This ensures that the start-up is at the same time performed rapidly and reliably.

It is also advantageous if the primary communication path is a protection path (PP1) which is set up in the at least one communication channel (TP1, TP2) of the first protection group for exchanging a protection protocol relating to the

allocation of the communication path groups to communication channels and the protection switching operation messages are exchanged via the protection protocol. This makes it possible to allocate the communication path groups during the start-up by using messages and signals which are already defined in the abovementioned ETSI standards and thus allows compatibility with previously known V5.2 interfaces.

To improve the start-up sequence also for the remaining communication path groups not belonging to the first protection group, it is advantageous if, after the first protection group (PGI) has been released, for each or at least one of the remaining communication path groups (LCA, LCB),

a) the communication path group (LCA) is allocated to a communication channel (TSA) not belonging to the first protection group on the basis of protection switching operation messages which are exchanged via the first protection group (PGI) and, if this has been done successfully,

b) the communication paths (CPII) of the communication path group (LCA) are released for exchanging communication information.

As a result, the advantages described above can also be achieved when these path groups are taken into operation.

The invention and other advantages will be explained in greater detail in the text which follows with reference to an exemplary embodiment which relates to the start-up of a V5.2 interface according to the invention by one of the network elements. For this purpose, the attached figures are used in which:

Figure 1 shows an exemplary diagrammatic section on a telecommunication network with two network elements connected by a V5.2 interface;

Figure 2 shows the internal structure of three of the links of the intermediate interface shown in Figure 1; and

Figure 3 shows a flowchart of bringing up the V5.2 interface into its operational state.

The architecture of the V5.2 interface VIF described in the introduction with the aid of Figures 1 and 2 is not affected by the invention. For a more detailed description of the V5.2 interface as compared with the introduction, reference is again made to the two ETSI standards ETS 300 324-1 and ETS 300 347-1.

According to the invention, the V5.2 interface VIF is brought up from a default state in which, according to preconditions b) to e) of ETSI Annex C, item 13, all time slots are enabled, the physical layer (layer 1 of the OSI reference model) and the transmission of the frame-delimiting flags are operational for at least one of the primary channels (see below), the link control FSMs are initialized according to standard and the exchange of communication information is out of operation or, respectively, blocked according to standard.

Furthermore, it is assumed that a specification relating to the time slots provided as C channels exists which can be given, e.g. as a preconfigured copy in one copy each both at the access network AN and the local exchange LE. For example, this specification is a list which contains the number of the link and of the time slot and information on whether the C channel is allocated to the type-1 protection group PGI or the type-2 protection group PGII for each C channel provided. The C channels allocated to the type-1 protection group will be called protection channels for the sake of brevity in the text which follows. As already mentioned, two protection channels TP1, TP2 must be predetermined in each case in time slot 16 of two of the links LNK of the V5.2 interface according to the ETSI standards (compare also Figure 2 in this respect); the actual number and

allocation of the protection channels, however, is of no significance to the invention. In addition, the presence of a default profile is not required in distinction from the ETSI standard.

The sequence according to the invention shown in the text which follows is shown in Figure 3 referring, at the same time, to the exemplary interface configuration resulting during the start-up, shown in Figure 2. Starting with said default state, the network element from which the V5.2 interface is brought up first determines the time slots for which protection channels are provided due to said specification.

From the protection channels TP1, TP2 thus determined, one channel is then selected as primary protection channel TP1 in which, as explained below, a primary communication path PP1 is set up for the signaling of the protection switching operations of the subsequent steps.

For selecting the primary protection channel, the protocols belonging to the type-1 protection group in the protection channels TP1, TP2 are checked to see whether they are operational. The protocol operation is advantageously examined primarily for the protection protocol because of its special significance in relation to the protection switching operation, and the protection channel which is the first one of the protection channels to provide an operational protocol for the primary communication path, i.e. an operational protection protocol in this case, between the two network elements is selected. This provides for a rapid performance of the start-up by using messages which are already predetermined in the ETSI standards.

If it is not possible to build up an operational protection protocol via one of the protection channels, there is the alternative in a manner corresponding to said ETSI standards

to use, instead of the protection protocol, another one of the "vital" protocols of the type-1 protection group and select it as the primary communication protocol if one of these vital protocols is operational. Since, in this case, a protection switching operation is not possible or possible only to a limited extent in the V5.2 interface due to the lack of an operational protection protocol and, under certain circumstances, an impairment of the information transmission on other transmission paths must also be expected, this possibility can be considered less for normal operation than rather for special operational modes such as, e.g. for protecting a reduced emergency traffic.

Thus, the prerequisites for activating a protection channel for the type-1 protection group as the primary protection channel TP1 are

(1) the functionality of the physical layer of the relevant link LN1;

(2) the reliable transmission of the so-called HDLC flags which are used for framing the data link layer message units; and

(3) the presence of an operational protection protocol where another vital protocol can also be used as replacement.

The first two conditions are already ensured due to the default state described above. With respect to the second condition, it must also be noted that the checking of the transmission of the frame delimiter for time slot 16 of the relevant link is adequate for the purpose of the type-1 protection group; in practice, it can be assumed that when the frame transmission for time slot 16 is free of errors, the frame transmission of the remaining time slots of the link is also intact. The third condition goes beyond the ETSI standards and is the result of the requirements of the feasibility of the following steps according to the method according to the invention.

For the protocol selected as primary protocol, a primary communication path PP1 is set up on the primary protection channel TP1. As a result, the link in which the primary communication path PP1 or protection channel TP1, respectively, is set up also becomes the primary link LN1. After this step, the primary communication path provides an established communication path between the two network elements AN, LE via the V5.2 interface VIF via which protection switching operations messages can now be exchanged for performing protection switching operations for C path groups.

A protection switching operation method in which - in the sense of the ETSI standards - the remaining C paths of the type-1 protection group with the "vital" protocols are allocated to the primary protection channel TP1 on the primary link LN1 is then performed for the C path group LC1 of the type-1 protection group PGI. The primary communication path PP1 is used, according to the invention, for transmitting the protection switching operation messages. The procedure of the protection switching operation is carried out in accordance with the ETSI standards, especially ETS 300 347-1, chapter 18.

After the completed protection switching operation of the type-1 protection group, the associated data paths are taken into operation for the "vital" protocols in accordance with the manner provided in the ETSI standards and the corresponding C paths are released for interchanging the communication information.

The protection switching operation and the taking into operation of the data paths is then performed for the other C path groups LCA, ..., LCC provided. The number of C path groups and the provided allocation to the C channels can be carried out by using a default profile. However, this is not required since the allocation must take into consideration the C channels which are actually operational, in any case,

and the order of allocated C channels per se is arbitrary even if a preferred order is described in ETS 300 347-1, section 8.4 and,

respectively, 18.1.4, which, naturally, can also be observed here.

For such a C path group, for example the C path group LCA of the type-2 protection group PGII, a protection switching operation method is first performed for a free C channel TSA - again in the sense of the ETSI standards. During this process, the type-1 protection group, naturally, preferably the primary communication path PP1, is used for transmitting the protection switching operation messages. The process of protection switching operation is carried out in correspondence with the ETSI standards, especially ETS 300 347-1, chapter 18. After completed protection switching operation of the C path group LCA, the protocols belonging to the C path group LCA are taken into operation in accordance with the manner provided in the ETSI standards and the corresponding C paths are released for interchanging communication information. This part-sequence is repeated for the other C path groups LCB, LCC provided.

After all protection groups PGI, PGII have been taken into operation, the data traffic can now be started via the V5.2 interface VIF. The start-up has been performed and the interface is in its operational state.

Due to the method according to the invention described, the resultant essential advantage is the taking into operation, coordinated between the network elements AN, LE, of the message traffic via the C channels provided for the type-2 protection group PGII or, respectively, time slots TSA, ..., TSE of the V5.2 interface VIF. The correct allocation of the C path groups to C channels reliably corresponding for both network elements is a consequence of the sequence according to the invention and does not need to be prepared by a default profile. This eliminates one possible error source. Using protection switching operation messages according to ETS 300 347-1, in addition, brings with it increased safety due

to the fact that the taking into operation is confirmed by the other network element LE, AN in each case.

In addition, the invention allows a simplified technical implementation since the same mechanism can be used for taking into operation and managing the communication protocols both in start-up and in operation. In addition, the reliability of the start-up is increased which leads to a reduction in the downtimes to be expected.

Another advantageous consequence of the invention is that the TC8 and TC9 timing elements can be omitted. It can be seen from ETSI Annex C, item 29, that the system waits for the TC8 or TC9 timing element to time out before beginning with a restart in the case of a restart of the V5.2 interface VIF, depending on the triggering event (e.g. timeout of the TC2 timing element or restart instruction by the operating personnel); these timing elements are intended to ensure that both network elements AN, LE perform a restart by using the default profile. Since the latter is not required according to the invention, the restarting can take place immediately after the triggering event in the case of a restart. In this manner, the invention allows dead times to be avoided during the bringing up of the V5.2 interface. In addition, it eliminates the possibility, which previously existed in special initial constellations, of a repeated alternating restarting due to mutual triggering due to the dead times of the timers.

Patent claims

1. A method for bringing up an intermediate interface (VIF) of a telecommunication network (TKN) to its operational readiness, via which two network elements (AN, LE) such as, e.g. a local exchange and an access network, for establishing and maintaining subscriber connections of the network (TKN) are connected and in which

- one or more links (LNK) are provided, the or each link (LNK) exhibiting a number of transmission channels (TSL) for exchanging user information of the subscriber connections and for exchanging communication information for controlling the subscriber connections and managing the intermediate interface (VIF) and
- due to a preestablished configuration of the intermediate interface (VIF), a number of transmission channels is provided as communication channels (TP1, TP2, TPS) for exchanging communication information and at least one (TP1, TP2) of the communication channels is allocated to a first protection group (PGI),

wherein, in the operational state of the intermediate interface (VIF), the communication information is exchanged via communication paths (CPI, CPII) which are combined in groups (LC1, LCA, LCB) of in each case one or more communication paths and each communication path group is allocated at least temporarily to a communication channel, a number of predetermined communication paths (CPI) being combined in a separate communication path group (LC1) which is allocated to the first protection group (PGI), characterized in that

a) a primary communication path (PP1) is set up in the communication channel (TP1) of the first protection group or one of the communication channels of the first protection group, then
b) the communication path group (LC1) of the first protection group is allocated to the communication

channel (TP1) containing the primary communication path on the basis of protection switching operation messages which are exchanged via the primary communication path (PP1) and relate to the allocation of the communication path groups to communication channels and, if this has been done successfully,

c) the communication paths of the first protection group (PGI) are released for interchanging communication information.

2. The method as claimed in claim 1, characterized in that, if a number of communication channels (TP1, TP2) are allocated to the first protection group (PGI), the primary protection path (PP1) is set up in the communication channel which is the first one among said communication channels to provide an operational protocol for the primary communication path between the two network elements (AN, LE).

3. The method as claimed in claim 1 or 2, characterized in that the primary communication path is a protection path (PP1) which is set up in the at least one communication channel (TP1, TP2) of the first protection group for exchanging a protection protocol relating to the allocation of the communication path groups to communication channels and the protection switching operation messages are exchanged via the protection protocol.

4. The method as claimed in one of claims 1 to 3, characterized in that, after the first protection group (PGI) has been released, for each or at least one of the remaining communication path groups (LCA, LCB),

a) the communication path group (LCA) is allocated to a communication channel (TSA) not belonging to the first protection group on the basis of protection switching operation messages

which are exchanged via the first protection group (PGI) and, if this has been done successfully,

b) the communication paths (CPII) of the communication path group (LCA) are released for exchanging communication information.

Abstract

Method for bringing up an intermediate interface, e.g. a V5.2 interface

To bring up an intermediate interface set up between two network elements of a telecommunication network, comprising a number of communication channels for exchanging communication information for managing the intermediate interface, in which at least one of the communication channels is allocated to a first protection group and the communication information is exchanged via communication paths, a number of predetermined communication paths being combined in a separate communication path group allocated to the first protection group, a primary communication path is set up in the communication channel of the first protection group; then the communication path group of the first protection group is allocated to the communication channel containing the primary communication path on the basis of protection switching operation messages which are exchanged via the primary communication path; and the communication paths of the first protection group are released for exchanging communication information.

Figure 3

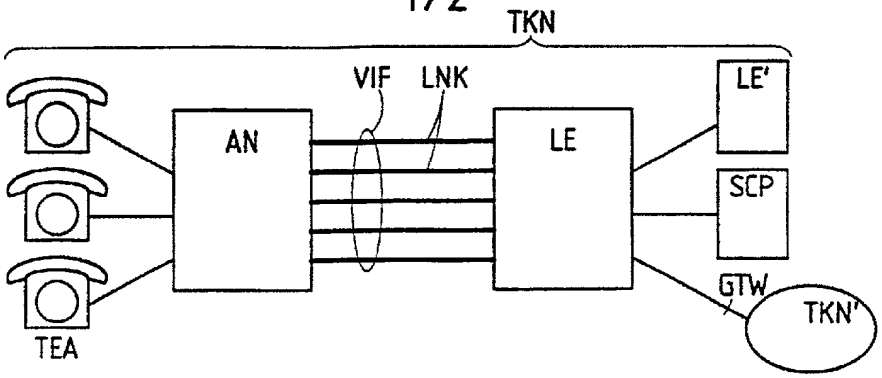

Fig. 1
(Prior art)

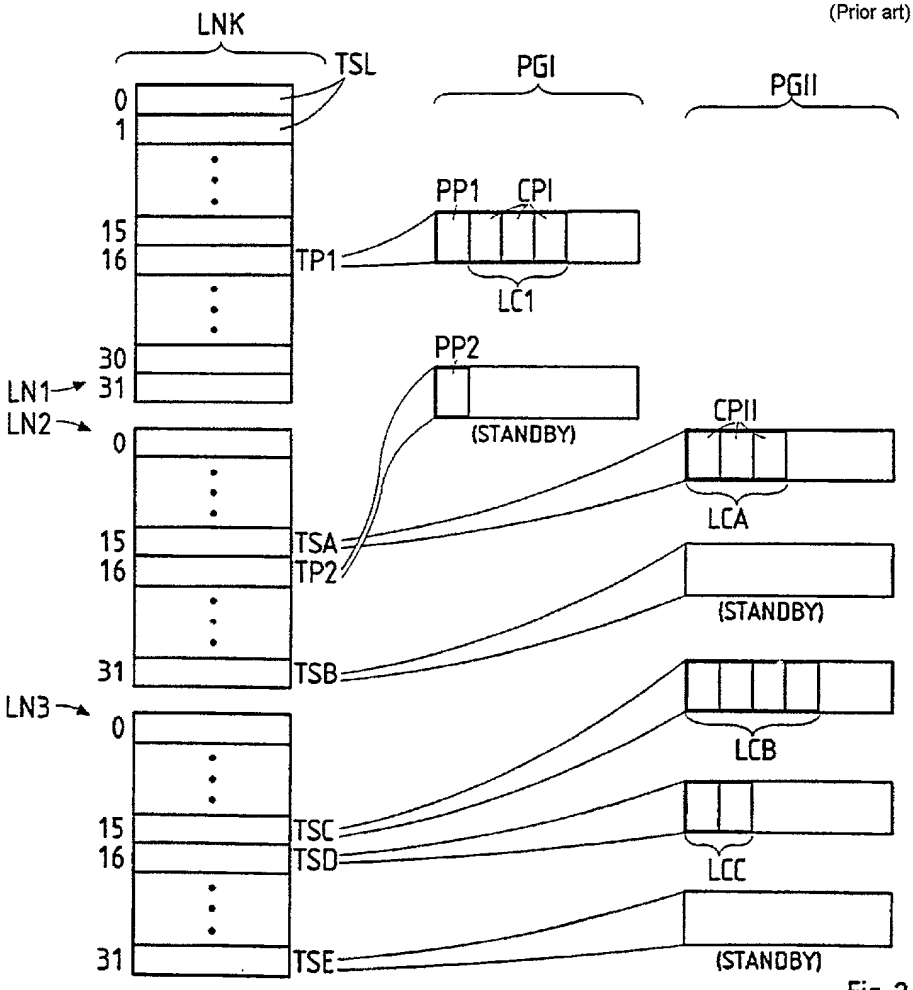

Fig. 2
(Prior art)

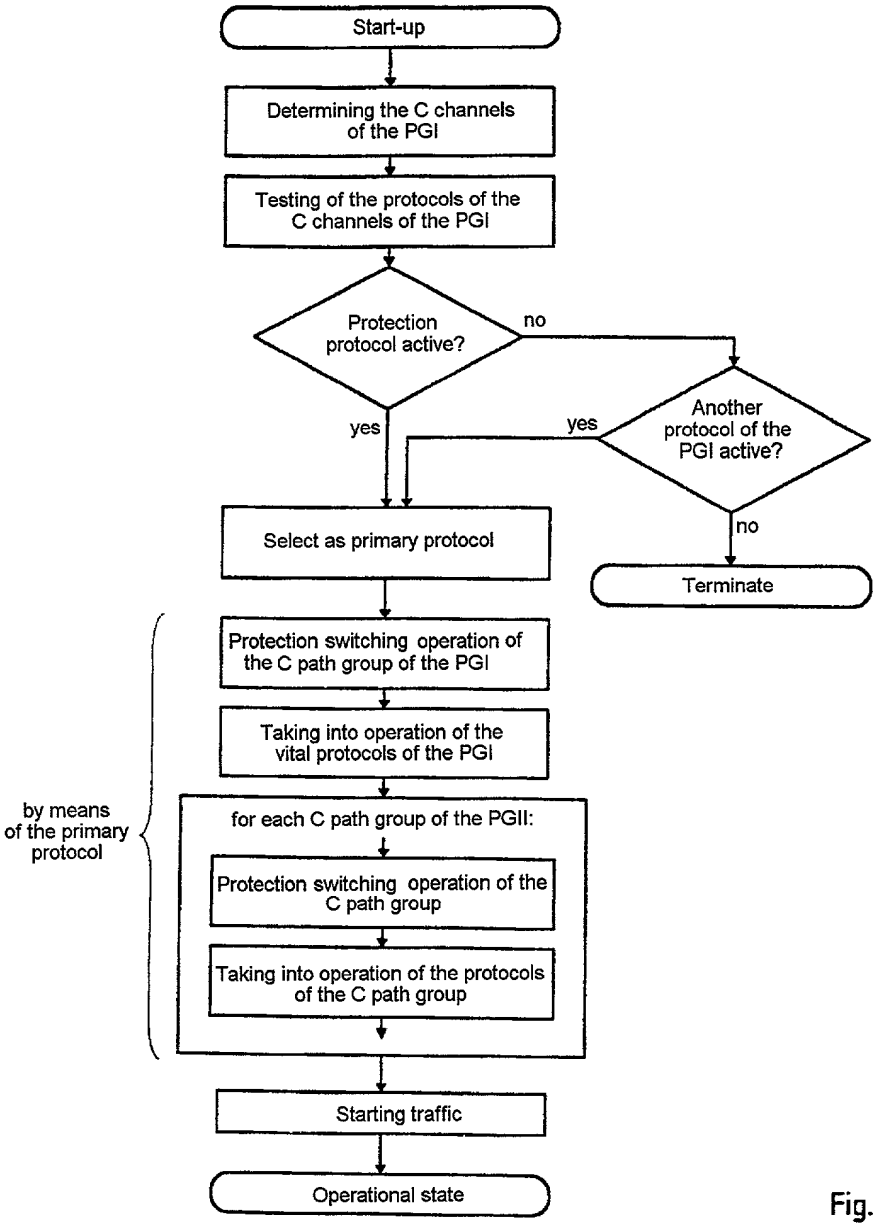
Start-up
Determining the C channels of the PGI
Testing of the protocols of the C channels of the PGI
Protection protocol active?
no
yes
Another protocol of the PGI active?
yes
no
Select as primary protocol
Terminate
Protection switching operation of the C path group of the PGI
Taking into operation of the vital protocols of the PGI
by means of the primary protocol
for each C path group of the PGII:
Protection switching operation of the C path group
Taking into operation of the protocols of the C path group
Starting traffic
Operational state

Fig. 3

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren zum Hochfahren einer Zwischenschnittstelle, z.B. einer V5.2-Schnittstelle

Method for ramping up an interface, e.g. a V5.2 interface

deren Beschreibung

(zutreffendes ankreuzen)
☐ hier beigefügt ist.
☒ am 03.11.1999 als
PCT internationale Anmeldung
PCT Anmeldungsnummer PCT/DE99/03513
eingereicht wurde und am ________
abgeändert wurde (falls tatsächlich abgeändert).

the specification of which

(check one)
☐ is attached hereto.
☒ was filed on 03.11.1999 as
PCT international application
PCT Application No. PCT/DE99/03513
and was amended on ________
(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
19854654.8	DE	26.11.1998	☒	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
			☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
			☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE99/03513	03.11.1999		
(Application Serial No.)	(Filing Date D, M, Y)	(Status)	(Status)
(Anmeldeseriennummer)	(Anmeldedatum T, M, J)	(patentiert, anhangig, aufgegeben)	(patented, pending, abandoned)
(Application Serial No.)	(Filing Date D,M,Y)	(Status)	(Status)
(Anmeldeseriennummer)	(Anmeldedatum T, M; J)	(patentiert, anhängig, aufgeben)	(patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

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German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

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Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor:
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Unterschrift des Erfinders Datum: 4.4.2001	Inventor's signature Date
Wohnsitz	Residence
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Staatsangehorigkeit	Citizenship
AT	AT
Postanschrift	Post Office Addess
STADLAUERSTR. 47/9	STADLAUERSTR. 47/9
A-1220 WIEN	A-1220 WIEN
Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders Datum	Second Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
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(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).